WEATHER ON THE NORTH PACIFIC OCEAN

By WILLIS E. HURD

Atmospheric pressure.—With the movements of cyclones over northern waters in March 1941, many of the principal centers of low pressure entered or remained for several days over the western part of the Gulf of Alaska. Kodiak this month was close to the center of the Aleutian LOW, with a mean pressure of 997.2 millibars (29.45 inches), which is 8.2 millibars (0.24 inch) below the March normal. Low barometer prevailed throughout higher latitudes, with a secondary center west of the Aleutian Islands.

From the California coast southwestward about two-thirds of the way to the Hawaiian Islands, several depressions of the month contributed to lower the average barometer several millimeters under the normal. The North Pacific anticyclone lay to the westward of the depressed region, and from Honolulu across Midway Island to the coast of China, the barometer averaged above the normal for March.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure at sea level, North Pacific Ocean, March 1941, at selected stations*

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Millibars	*Millibars*	*Millibars*		*Millibars*	
Barrow	1,025.1	+4.1	1,040	25	1,006	7
Dutch Harbor	998.9	−6.9	1,021	9	978	30
St. Paul	1,003.2	−3.6	1,029	9, 13	981	2
Kodiak	997.2	−8.2	1,016	13	984	4
Juneau	1,012.2	−1.7	1,029	9	998	20
Tatoosh Island	1,015.9	+1.3	1,034	8	989	1
San Francisco	1,013.9	−4.1	1,027	8	1,000	31
Mazatlan	1,013.1	−0.1	1,015	1-4, 11-12	1,010	22
Honolulu	1,019.0	+1.7	1,025	30	1,013	13
Midway Island	1,022.8	+4.5	1,028	14, 16-17, 31	1,002	23
Guam	1,012.3	−0.2	1,016	5	1,007	9
Manila	1,011.6	+0.6	1,016	5	1,009	9, 10, 17
Hong Kong	1,014.6	−0.6	1,022	4	1,010	23
Naha	1,016.6	+0.7	1,026	5	1,006	17
Titijima	1,017.8	+1.9	1,028	6	1,010	18
Petropavlovsk	1,001.1	−6.0	1,016	7	985	22

NOTE.—Data based on 1 daily observation only, except those for Juneau, Tatoosh Island, San Francisco, and Honolulu, which are based on 2 observations. Departures are computed from best available normals related to time of observations.

Cyclones and gales.—Despite the depth of the Aleutian LOW, which gave evidence of much cyclonic activity in higher latitudes of the North Pacific in March 1941, there were only a few reports from ships to show the existence of gale-force winds along the northern steamship routes. Early in the month, rather severe storm conditions occurred in waters east of northern Japan and the Kuril Islands, accompanied by snow squalls to heavy snows from the 2d to 7th, as reported by several vessels. In connection with this storm, the American S. S. *Illinois*, near 46° N., 155° E., had a low barometer of 976 millimeters (28.82 inches) on the 2d, followed by a northwest gale of force 8. The highest wind of record for the period was a westerly gale of force 10, reported by the American M. S. *Aurora* on the 6th, near 45° N., 156° E. On the 9th the *Aurora* ran into a further gale, of force 10 from the south, near 47½° N., 168° E.

In middle longitudes the only gales of consequence arising from passing cyclones of higher latitudes occurred on the 8th and 18th. Both were accompanied by moderately low barometer. The earlier, of force 10, was experienced by the Panamanian M. S. *California Standard*, near 43° N., 179° E.; the latter, of force 11—the highest of the month—by the Japanese M. S. *Kiyo Maru*, near 45° N., 175° W.

In middle latitudes northwesterly gales of force 9 were met in the high-pressure area north of Midway Island on the 12th. A short distance out from Yokohama force 9 gales occurred on the 12th and 20th in cyclones of moderate intensity. Between southern Japan and Midway Island, isolated fresh gales were noted on the 1st, 8th, and 11th.

As in the preceding December and February, the stormiest part of the ocean in March was that between about 28° and 40° N., from the California coast westward to approximately 145° W. Several depressions affected this area between the beginning and ending of the month. The earliest gale, of force 8, on the 1st, occurred about 200 miles west of San Francisco, in connection with a LOW off the Oregon coast.

On March 2 a cyclone center appeared near 40° N., 140° W. It moved east-southeastward and on the 4th entered the middle California coast. The storm was only moderately deep, the American S. S. *La Placentia* reporting a barometer of 992.6 millibars (29.31 inches) on the 3d, accompanied by a northwest gale of force 9, near 35° N., 128½° W. The highest wind, of force 10 from west-southwest, was encountered by the American S. S. *Lahaina* late on the 2d, near 34° N., 130° W.

What appeared to be a secondary depression gathered on the 5th near 38° N., 148° W., at the southern extremity of a cyclone central over the Gulf of Alaska. From the 6th to the 14th it took a slow, meandering course, performing two distinct loops before finally entering the southern California coast. During the 6th to 8th the center oscillated between about 27° and 32° N., 140° and 135° W. To the westward lay a bank of high pressure. Between the HIGH and the LOW strong northwesterly winds occurred, at times rising to force 8 and 9. The disturbance lost energy during the 9th and 10th, but on the 11th and 12th, it again exhibited local strength, with northwesterly gales of force 8 to 9 near 34°–35° N., 133° to 136° W.

On the 20th, 22d, and 23d strong northerly winds, at times rising to force 8, were experienced by vessels in the vicinity of Point Arguello. These occurred on the eastern edge of a high-pressure area lying off the California coast.

From the 26th to 31st another disturbance which formed west of California moved from approximately 35° N., 132° W., to about 40° N., 135° W., accompanied on the 26th and 27th by strong northwesterly winds, highest force 8 to 9, west of the center. The heaviest wind, a west gale of force 10, lowest barometer 994.9 millibars (29.38 inches), was reported on the 30th by the American S. S. *Matsonia*, near 34° N., 134° W.

Tehuantepecers and Papagayos.—Norther-type gales occurred in the Gulf of Tehuantepec as follows: of force 7 on the 14th and 15th; of force 8 on the 1st; and of force 9 on the 8th and 29th. Off the Costa Rican coast a northeasterly Papagayo of force 7 occurred on the 14th and one of force 8, on the 19th.

Fog.—Ships encountered a few scattered fogs on various parts of the ocean. In coastal waters they reported fog on 3 days off British Columbia; on 5 days off Washington; on 3 days off Oregon; and on 1 day off California.

FIJI HURRICANE OF FEBRUARY 20, 1941

By WILLIS E. HURD

Through kindness of Capt. E. R. Johanson, master of the American S. S. *Monterey*, a copy of "The South Sea Weekly—Special Hurricane Edition," of March 10, 1941, has been received, containing an account of the hurricane which struck the Fiji Islands on the 20th of the preceding February.

The storm was of a very erratic nature. It originated as a depression over northern Tonga several days prior to the 20th, crossed the Fiji Islands as still a weak LOW, backed later toward the Tongas, then returned to Fiji, intensifying with great rapidity. The high winds began from the south in the morning, and reached their greatest force from the north in the afternoon. The calm center crossed Levuka, beginning at about 11:45 a. m. and continuing for nearly an hour. During this period the sun shone for a few minutes. The lowest barometer, read as the light central winds were giving place to heavy northerly gales, was 28.37 inches (960.7 millibars). At Suva the maximum velocity was 110 miles. The rainfall at Suva amounted to 6.49 inches for the 24-hour period 8 a. m. of the 20th to 8 a. m. of the 21st.

Considerable damage was done in various parts of the islands to houses, fruit trees, and crops. Several small vessels were stranded on the reefs and beaches, and some were destroyed. A few lives were reported lost.

RIVER STAGES AND FLOODS

By BENNETT SWENSON

The precipitation pattern for March coincided very closely with that for February. As in February, precipitation was well above normal in the States from Texas westward to the ocean. All of the States in the northern, central, and eastern parts of the country were below normal except for South Carolina and Florida which were above normal. The central Mississippi and Ohio Valleys again were the driest sections of the country. River stages were unusually low in these sections. The Mississippi River at Vicksburg, Miss., had lower stages than previously recorded in March since 1895.

High water and light to moderate flooding continued in much of eastern Texas, in Arizona, and in California. These floods and others that occurred during the month are given below.

Atlantic Slope drainage.—The weather remained cold during most of the month with only short periods of high temperature. The snow cover in the Northeast was reduced somewhat with only moderate rises in the streams. At the end of the month the average snow depth over the Connecticut Basin was 9.6 inches with a water content of 3.1 inches; in the Susquehanna Basin above Towanda, Pa., the snow depth averaged 3.5 inches and below Towanda, only a trace.

Slight flooding occurred in the Neuse and Savannah Rivers during the month. In the Neuse River, flood stage was exceeded at Smithfield, N. C., on March 30. The Savannah River experienced two rises to slightly above flood stage at Clyo, Ga., and Ellenton, S. C. No damage was reported.

East Gulf of Mexico drainage.—Heavy rains on March 6–7, averaging about 3 inches over the Black Warrior and Tombigbee Rivers and 2.5 inches over the Pearl and Pascagoula Rivers, resulted in substantial rises in these rivers. Minor flooding occurred in the Tombigbee River below Demopolis, Ala., and at a few points in the Pearl and Pascagoula Rivers. The damage in the Tombigbee is estimated at $2,000, and in the Pearl and Pascagoula at $13,000.

Upper Mississippi Basin.—Flooding occurred in the Zumbro-Whitewater Rivers in Minnesota and in the Rock River in Illinois during the latter part of the month. No damage was reported except for a loss amounting to $2,500 in the Zumbro-Whitewater Basin.

Missouri Basin.—Ice broke up in the Heart River which drains into the Missouri River just below Bismarck, N. Dak., on March 26. During the night the Heart River rose considerably, the water being backed up by the solid ice in the Missouri. Some bottom lands were flooded but no damage resulted.

Flood stages were reached and exceeded in the Big Sioux and Floyd Rivers. Because of the earliness of the season there was no appreciable damage.

The following report was submitted by the official in charge, Helena, Mont.:

> An earlier-than-usual spring run-off of water from melted snow and ice in the upper drainage basin of the west and north forks of the Milk River was dammed by ice jams until March 21, when a breakup began. The water was released and overflowed the banks and inundated a large tract of land near the mouth of the streams in the vicinity of Chinook, Blaine County. Flood waters continued on the 22d, cresting on the 23d. When the flood waters reached the Milk River on the 23d, ice jams formed in that stream and caused flooding.
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> Most of the damage resulting from the flood occurred in the vicinity of Chinook, with lesser damage occurring near Harlem. The aggregate damage has been estimated at $10,000.

Red Basin.—Heavy rains in the watershed of the Ouachita and Little Missouri Rivers on March 6–7 caused flood stages in the Ouachita at Camden, Ark., from March 9–14 with only slight damage resulting.

River stages continued high in the Sulphur River from rains occurring at the end of February and again on March 6–7. The river crested at Ringo Crossing, Tex., on March 8 at a stage of 28.5 feet and at Naples, Tex., on March 11 at 27.6 feet. Losses were reported in the previous report.

West Gulf of Mexico drainage.—Rains were again above normal in eastern Texas during March and river stages continued high. Minor flooding occurred but with no appreciable damage.

Colorado River Basin.—Heavy rains, principally over the Verde River watershed, caused a rise in that river and in the Salt River into which it flows, the Salt River cresting at a stage of 7.4 feet at Phoenix, Ariz., on March 15. The flood was of a minor nature but was of much interest due to the fact that there had been no flow in the Salt River since the recent construction of Bartlett Dam on the Verde River which had contributed to the flood problem in Phoenix prior to the construction of that dam.

As a result of warnings issued no losses were experienced and it is estimated that the savings as the result of the warnings approximated $5,000.

Rains were heavy in central Arizona during the middle of March resulting in a local flood in Pinal Creek and considerable damage to highways. Two lives were lost in connection with a sudden rise in Clear Creek, a tributary of the Little Colorado River near Winslow, Ariz.

Pacific Slope drainage.—Stream discharges were high in most of California during the month. A surplus of water moved into the Tulare Lake Basin and additional farm lands were inundated. A mild flood occurred in the lower Eel River on March 1–2.

Another flood in the long series that marked the 1940–41 season began in the Sacramento Valley on the last day of February. The official in charge, Sacramento, Calif., reports as follows:

> Following the high water that occurred in this valley during the second week in February, frequent rains kept the water levels moderately high until near the end of the month, when flood conditions again developed in the upper Sacramento River.
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> During the closing days of February an unusually extensive system of low pressure which was charted off the Pacific coast caused